

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

“The American News Company,” Agents, 121 Nassau street, New York.
“The New York News Company,” 8 Spruce street.

Messrs. Sampson, Low, Son & Marston, Booksellers, Crown Building, 188 Fleet street, London, are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.

Tubner & Co., 60 Paternoster Row, London, are also Agents to receive subscriptions.

A. Asher & Co., 20 Unter den Linden, Berlin, are Agents for the German States.

VOL. XXI, No. 6... [NEW SERIES.]... Twenty-fourth Year.

NEW YORK, SATURDAY, AUGUST 7, 1869.

Contents:

(Illustrated articles are marked with an asterisk.)

*Caissons for Pier Building..... 81	Rolling and Tinning Iron..... 88
Objects of Interest on a Guano Island..... 82	Balancing Heavy Cylinders..... 89
Effect of Magnetism on Time-Pieces..... 83	Small Inventions most Profitable..... 89
On Rope-making..... 83	Obituary—Death of John A. Roebling..... 89
Acid Proof Cement..... 83	How it may be Ascertained..... 89
*The Diamond Bone Mill..... 84	The French Cable Laid..... 90
*A Very Old Invention..... 84	Joshua Shaw, Artist and Inventor..... 90
*The Shad Fisheries of the Hudson..... 84	—Early History of the Copper Percussion Cap..... 90
*The Grape-Berry Moth..... 85	Calculation of the Amount of Ice which can be Produced from a Given Amount of Coal in the Bridge..... 85
Expansion of Mineral Oils..... 86	Modern Ice Machine..... 91
Rights of Inventors..... 86	Discovery of the Weight of Air..... 91
Nocturnal Hall Storms..... 86	Self-Sealing Gas Retort Ltd..... 91
How to Make Good Bread..... 86	Boiler Inspector's Reports for June..... 91
Anthracite Ashes for Earth Closets..... 87	Manufacturing, Mining, and Railroad Items..... 91
What Chemistry Tells us of Life..... 87	Answers to Correspondents..... 91
An Imported Steam Plow..... 87	Recent American and Foreign Patents..... 92
Glycerin and Distillation..... 87	List of Patents..... 93
New Dose for Hogs..... 87	Inventions Patented in England by Americans..... 94
*Device for Tightening Tires of Wagon Wheels..... 87	Applications for the Extension of Patents..... 94
To Measure Heights..... 88	
Emperor Napoleon III. as a Man of Science..... 88	
*A New Lamp Extinguisher..... 88	

BALANCING HEAVY CYLINDERS.

The shaking of heavy cylinders, grindstones, millstones, etc., etc., when out of balance, depends upon and is caused by the irregularity of centrifugal force on the opposite sides of the wheel. That is, if the centrifugal force, or the sum of the tendencies to fly off in tangents to their arcs of revolution, possessed by all the particles on the lighter side, be represented by a , and that on the heavier side by b , the power to which the shaking is due will be represented by the expression $b - a$. Suppose, in a given case, b equals a pressure of 4,000 pounds, and a equals 3,750, the force with which the cylinder would be shaken would be 250 pounds moving from one side of the axis to the other, and a vibration would be produced upon each interchange of place between the heavier and lighter sides, having for one of its elements of measure the ratio existing between the difference of the centrifugal forces of the opposite sides, and the weight of the cylinder.

If all the supports of such unbalanced wheels or cylinders were perfectly rigid and inelastic, no vibration would be felt, but the strain upon the axle journals and boxes would remain undiminished, so that greater strength of parts would be necessary in order to avoid breakages, and loss of power would accrue.

In order that a cylinder may be perfectly balanced, when in motion, it is necessary that the sum of the moments of the particles on one side (that is the sum of their several weights multiplied into their several velocities), should exactly equal the sum of the moments of the particles on the other side, when the cylinder is running at any speed.

This can never be more than approximately attained in practice. The writer, who has had considerable experience in balancing heavy cylinders, designed to run at high speeds, has found the following method the best:

The cylinder being keyed upon its axle, as it is intended to run, is lifted by a tackle or crane, and lowered, so that each of its journals rests upon a stout steel straight-edge placed so that its upper surface is exactly level, and parallel with its fellow.

These straight-edges should not only be so rigid as to suffer no sensible deflection from the weight of the cylinder to be balanced, but they should be very hard and as smooth as it is possible to make them; and great care should be taken to keep them free from indentations. The journals of the cylinder must also be round and polished in order to secure delicate action.

All the friction is thus converted into rolling friction, and this is reduced to a minimum. The cylinder can now be loaded on its lighter side, or *vice versa*, until it will remain perfectly motionless when stopped in any part of its revolution. We have balanced heavy cylinders in this way until they would revolve by placing upon either side one twenty-thousandth of their weight.

The method sometimes practiced of suspending a cylinder by the centers of the journals is not sufficiently delicate. Either the lathe centers will be so forced in as to greatly increase friction, or there will be some play, so that the center of suspension will be outside the center of the axle. The latter makes no difference where the cylinder can roll, as on the steel straight-edges, but when suspended from a point, it will certainly defeat the attainment of any great degree of accuracy.

SMALL INVENTIONS MOST PROFITABLE.

The adjective “small,” as used in the above heading, is employed for want of a better term, to indicate devices of the most simple character, requiring little mechanical skill in construction, and little genius to invent. Such inventions are, for the most part, the result of ideas based upon some happy suggestion. The question “Why could not this be done in some other way?” has often been the indirect cause of putting thousands of dollars in the pockets of men of inventive talent. Such men at once grasp the possibilities, and perhaps the next morning sees them with a model whittled out, and preliminary steps toward securing a patent in progress.

Not a few men, however, after having conceived good and practical ideas neglect them. “It is such a little thing. There cannot be much money in it even if it should prove the very thing wanted.” Thus they fritter away chances to make money. The chances are that small inventions will pay better than large ones. To work out and develop grand and complex ideas, requires time and often large expenditures. For the most part, these inventions apply to some particular branch of industry and the demand for them is limited. But small inventions are of more universal application, and, if useful, a large demand is created at once.

A shoe peg is a small thing; a little prism of wood with a quadrangular pyramid at one end. But little as it is, could a man so improve it that it would be only a little better than it now is, while its cost would remain the same, a patent on such improvement would be immensely valuable. Why? Because shoe pegs are in universal demand; and what everybody wants, it takes large quantities to supply.

In a recent conversation with an inventor, he recounted numerous inventions that he had let slip when the idea of their practicability first occurred to him, since patented by others who have made money on them. This is not a solitary instance. Hundreds have given like testimony in our hearing. Many men, overlooking the small to grasp the large, have let fortunes slip through their fingers.

One of the most notable small inventions is that of the gimlet-pointed screw. Slight as was the change made by this improvement, it has virtually driven the old form of screw from the market, and the profits already made and now making upon its sale, are such as to make it one of the most valuable patents ever issued.

The value of an improvement must be indeed small, if it will not repay the expense of patenting with a profit into the bargain. Ideas should not be frittered away any more than money. The law recognizes original and useful mechanical ideas as property, and makes ample provision for the security of such property as for any other. Ideas may or may not be valuable, but mistakes in estimating their worth do not often occur than in judging of other property. And, were a comparison to be instituted between the success achieved by inventors and that attained by lawyers, physicians, or any other profession involving chiefly brain labor, nothing like the disparity generally supposed to exist would be found. In fact, we believe the difference to be in favor of the inventor, and that this useful class of men, are on the average, better fed, housed, and clothed, and more likely to have a snug balance in bank than lawyers, doctors, or literary men.

We admit that they are often made the dupes of sharp swindlers, who contrive to gain for little or nothing the reward of their honest labors. But people in other occupations are also cheated. Inventors, as a class, are singularly honest in their own dealings, and so are not apt to doubt the honesty of others. This is one of their characteristic mistakes, which, together with some other business mistakes they are apt to make, will form the subject of a subsequent article.

We have endeavored to call the attention of inventors in the present article to the value of apparently small improvements. An excellent illustration of this was given in our last issue—the portable railroad invented by A. Peteler. This invention, Mr. Peteler informs us, was laughed at, and declared worthless by many when it was proposed to patent it, and yet in a short space of time, very limited portions of territory have been sold for over sixty thousand dollars. We could if we chose to extend this article, easily adduce many other examples to show that it is not wise for the inventor to despise the day of small things.

OBITUARY.—DEATH OF JOHN A. ROEBLING.

John A. Roebling, C. E., whose fame as an engineer has made his name familiar throughout the civilized world, died at the residence of his son in Hicks street, Brooklyn, on the 22d of July. His death resulted from lockjaw, caused from an injury to his foot, which rendered amputation necessary. The bruise was received while he was in company with his son engaged in surveying the approaches to the projected East River Suspension Bridge, about to be erected between New York and Brooklyn.

Mr. Roebling was born June 12, 1806, at Muhlhausen in Thuringia, Prussia. He received the degree of C. E., from the Royal Polytechnic School at Berlin, and it is worthy of notice that the subject of his graduating thesis was suspension bridges. With this class of structures his name will ever be identified.

He came to the United States in 1831, and bought a considerable tract of land near Pittsburgh, Pa. He soon after commenced the practice of his profession, and continued it upon various railways and canals for more than ten years, before the time ripened for him to carry out his ideas of a suspension bridge.

In 1844, having previously commenced the manufacture of wire rope, he was awarded the contract for reconstructing the wooden aqueduct of the Pennsylvania Canal across the Alle-

ghany River, upon the suspension principle, which he successfully accomplished. This aqueduct consisted of seven spans, each 162 feet in length. The wooden trunk which held the water, was supported by two continuous wire cables, seven inches in diameter. The Suspension Bridge across the Monongahela, at Pittsburgh, succeeded. This bridge has eight spans 188 feet long, and the cables are 4½ inches in diameter.

Mr. Roebling contracted, in 1848, to erect four suspension aqueducts on the line of the Delaware and Hudson Canal, all of which were completed in due time. In 1851 the great Suspension Bridge at Niagara, was commenced, and was completed, so that the first locomotive crossed in March, 1855. This was an engineering feat, that compelled the universal acknowledgment of Mr. Roebling's great genius.

At the time the Niagara Bridge was commenced, Mr. Roebling also commenced a bridge over the Kentucky River, on the line of the Southern railroad, leading from Cincinnati, to Chattanooga. This bridge progressed no farther than the completion of the towers, owing to financial failure on the part of the company. This bridge would, if completed, have been a more remarkable work than the one at Niagara, the span being 1,224 feet.

The subsequent works of Mr. Roebling, were the bridge over the Alleghany River at Pittsburgh,—the most elegant suspension bridge probably in this continent; and the Ohio Bridge at Cincinnati, completed in 1867.

The reports, plans, and specifications of the East River bridge are completed, and Mr. Roebling will have a worthy and able successor in his son, who has assisted his father in his later works.

Altogether few men have lived whose history can record a series of more brilliant successes than that of Mr. Roebling. He leaves behind him monuments of his greatness, and his name will pass into history among the brightest of those who have achieved immortality, by benefiting the human race. That he has been cut off thus on the threshold of his greatest undertaking, adds to our sincere regret; but that he could not live to see its completion, will not detract from the well-won renown of its gifted and accomplished designer.

CURRENCY REFORM NEEDED—HOW IT MAY BE ACCOMPLISHED.

An important movement in commercial circles is now on foot, having for its object a radical reform in our present currency. The means to be adopted to secure this reform is an association whose aim is to press upon the minds of citizens in general, and upon Congress in particular, a method whereby an elastic currency that will continuously accommodate itself to the needs of the business community may be substituted for the present utterly inelastic and inefficient medium.

The experience of the last few days is sufficiently convincing of the urgent need of reform. During that time money has demanded so high a rate of interest that it failed to meet the most pressing requirements of legitimate business, and most serious business depression has spread over the land.

Never in the history of this country was business more unstable than now, never a time when it was so difficult to tell what the morrow would bring forth.

While our special province precludes the opening of our columns to protracted discussion and debate upon questions of finance, we feel that it is our duty to notice and second, a movement which, if wisely conducted, can scarcely fail to accomplish much good to the country at large.

The control of the money market has hitherto been to a great extent in the hands of the financial vultures of Wall street, parasites upon the commonwealth who suck the blood of the people, only pausing at intervals to allow their victims to accumulate a fresh supply. The silly moths who cannot keep out of the flame and get their wings singed in foolish speculations in stocks, have our sympathy for their weakness, but were the evil influences of stock gambling confined to these feeble sufferers, we should hardly consider it worth our while to notice them. But when combinations of unprecedented magnitude have so far secured control of financial interests that they can tighten or relax the money market at will, it is time to see whether the country must quietly submit to the financial disturbances they now create at pleasure.

That no one man, or one thousand men, or one hundred thousand men should have it in their power to control the money market appears to us so self-evident as to need no protracted argument.

In 1857, when the banks throughout the country, struck with what proved subsequently to be a senseless panic, refused discounts, the merchants of New York compelled their suspension by withdrawing their deposits. The history of that disastrous financial crisis teaches how much the country loses upon the occurrence of any such suspension of general business.

An exchange has demonstrated that the loss accruing to all classes during twelve months succeeding the panic of 1857 was equal to \$2,700,000,000, or in round number \$200,000,000 in excess of the present national debt.

In other words a panic of one year in trade cost us as much in money as a war of four years.

How are panics to be avoided? The plan originated by the New York *Mercantile Journal*, an outline of which we gave in a leading article published in our issue of December 2, 1868, is advocated at present by the promoters of the “Currency Reform Association.”

This plan has been rapidly gaining converts in opposition to deep-rooted prejudice. Although at first sight there may appear to be serious objections to its adoption, we believe a careful examination will show them to be baseless. This plan is set forth in the following extracts from the financial and commercial platform of the journal referred to:

“We hold that next in importance to the joint and har-